PAMS Technical Documentation

NSE–6 Series Transceivers

Tuning Instructions

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Tuning Instructions

General

All tuning operations of the NSE–6 are carried out using the service software. The service software turns the phone into the locals mode, in which the phone can be outwardly controlled via the MBUS interface.

Tuning is based on the software communicating with the D/A and A/D converters of the phone. In some instances the phone processor will also calculate the required correction parameter.

The tuning values of the phone reside on the EEPROM. The contents of the EEPROM can be read by the service software and saved as a file. This is advisable when there is need to retain that information, e.g. in view of replacement of the circuit. The program also enables writing the default parameters on the EEPROM, in which case all tuning steps should be carried out.

During tuning, proceed as follows:

- Take care not to damage sensitive measuring instruments with excessive RF power.
- Carry out all tuning steps in the shortest possible time to avoid excessive heating of RF units.
- Perform all tuning steps in the order presented.
- Never try to mask a fault by tuning it out!

Required Equipment

- PC/AT computer with service software; see separate section for instructions on installation and use.
- Service accessories; see equipment setup pictures.
- Multimeter or DVM.
- GSM radio telephone test station or separate measuring equipment as follows:
    - RF generator
    - pulse power meter
    - spectrum analyzer
    - attenuator and branching unit

Equipment Setup

Caution: Make sure that you have switched off the PC and the printer before making connections !

Caution: Do not connect the PKD–1 key to the serial port. You may damage your PKD–1 !

Attach the protection key PKD–1 to parallel port one (25–pin female D–connector) of the PC. When connecting the PKD–1 to the parallel port be sure that you insert the PC end of the PKD–1 to the PC (male side). If you use a printer on parallel port one, place the PKD–1 between the PC and your printer cable.

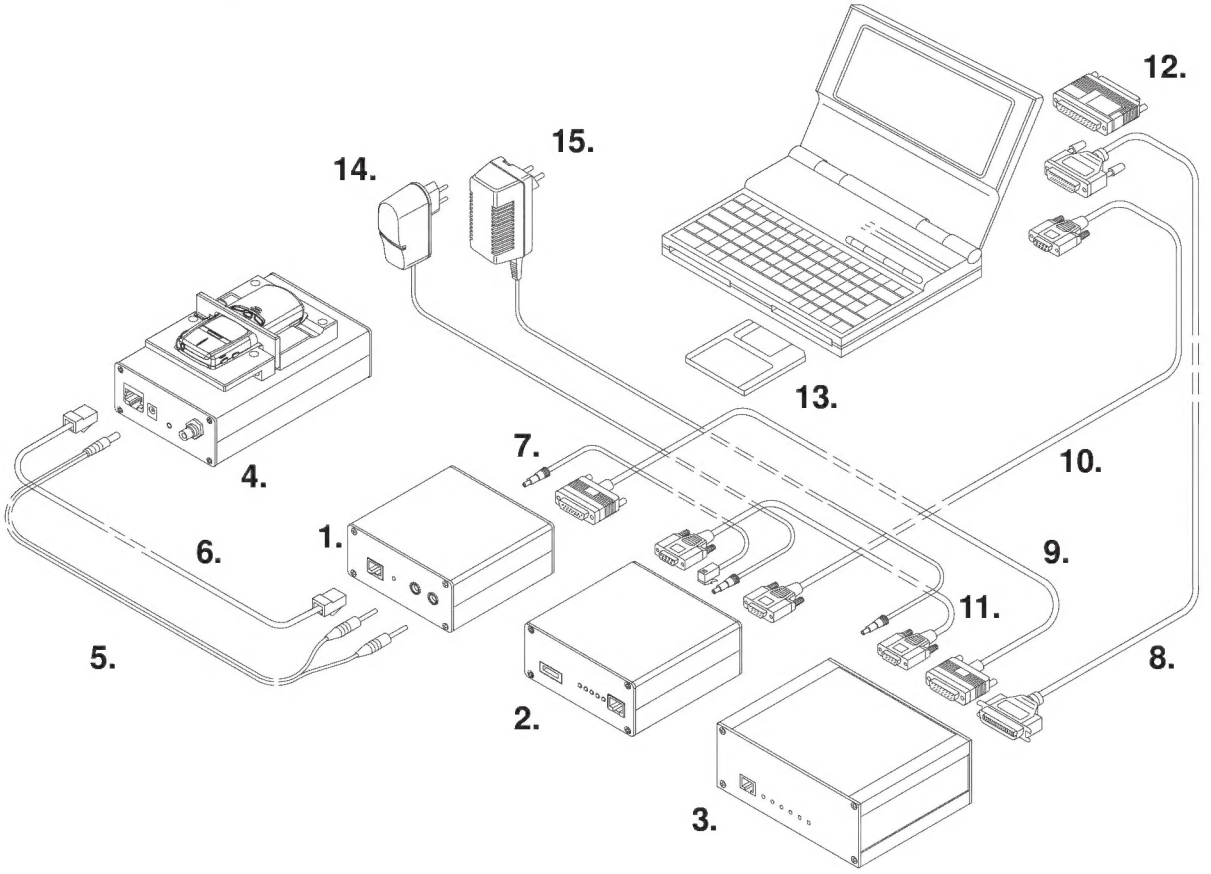
Next connect the M2BUS service cable, DAU–9S, to the serial port (RS–232) of the computer. Attach one end of the service cable to the PC serial port and the other end to the service box, JBA–4. For servicing the phone with the covers in place the service box should always be used.

When the phone covers are removed the jigs should be used.

For audio measurements connect the audio cable, ADS–1, as follows:

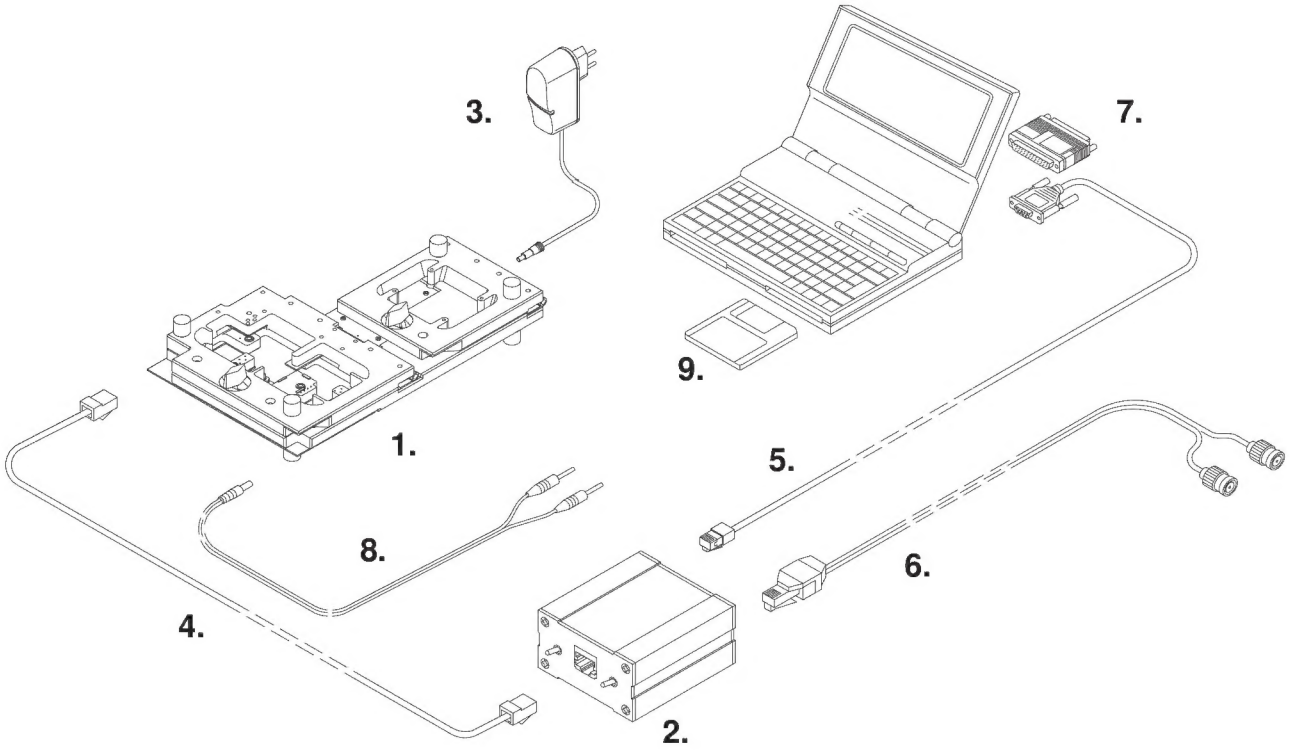
– EAR line to AF INPUT of test equipment
– MIC line to MOD GEN OUTPUT of test equipment

Flash Concept for NSE–6



Item:	Service accessory:	Product code:
1	Flash Loading Adapter FLA–5	0080178
2	Flash Security Box TDF–4	0770106
3	Prommer FPS–4S	0085095
4	Service Box JBU–5	0770120
5	DC Cable PCS–1	0730012
6	Service Cable XCM–5	0730142
7	DC Cable PCC–1B	0730053
8	Printer Cable (Included in FPS–4 sales pack)	0730029
9	D15 – D15 Cable AXS–5 (FLA–5 sales pack)	0730091
10	D9 – D9 Cable AXS–4 (Included in FPS–4 sales pack)	0730090
11	D9 – D9 Cable AXS–4	0730090
12	Software protection key PKD–1	0750018
13	Service SW diskette 3.5” for NSE–6	0774080
	Service SW diskette 3.5” for WinTesla	0774046
14	Travel Charger ACH–6E (Euro)	0270381
	Travel Charger ACH–6U (USA/Japan)	0270382
	Travel Charger ACH–6X (UK)	0270380
15	AC Charger ACL–3E (Included in FPS–4 sales pack)	0680015

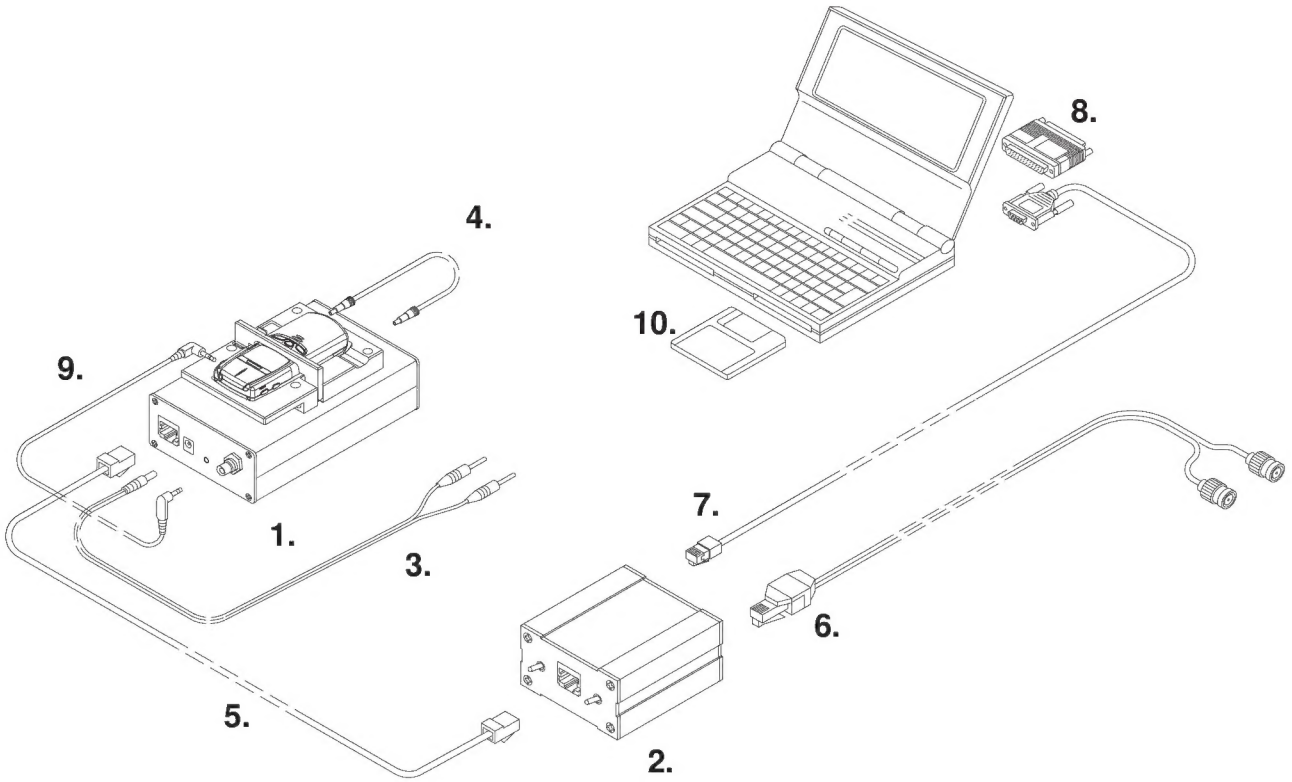
Tuning with Test–frame MJS–6



Item:	Service accessory:	Product code:
1	Module Jig MJS–6 *	0770121
2	Service Audio Box JBA–4	0770094
3	Travel Charger ACH–7E (Euro) Travel Charger ACH–7U (USA/Japan) Travel Charger ACH–7X (UK)	0675144 0675143 0675145
4	Service Cable XCM–5	0730142
5	Service MBUS Cable DAU–9S	0730108
6	Audio Cable ADS–1	0730011
7	Software Protection Key PKD–1	0750018
8	Audio Cable ADS–1	0750018
9	Service SW diskette 3.5” for NSE–6 Service SW diskette 3,5” for WinTesla	0774080 0774046

*) The nominal operating voltage for MJS–6 is 3.6 V.
The supply voltage for MJS–6 must never exceed 5.0 V

Testing With Covers On – using Service Box JBU–5



Item:	Service accessory:	Product code:
1	Service Box JBU–5	0770120
2	Service Audio Box JBA–4 **	0770094
3	DC Cable PCS–1	0730012
4	DC Cable SCB–3 for Service Box	0730114
5	Service Cable XCM–5	0730142
6	Audio Cable ADS–1	0730011
7	Service MBUS Cable DAU–9S **	0730108
8	Software Protection Key PKD–1	0750018
9	Audio Cable SCA–5	0730136
10	Service SW diskette 3.5” for NSE–6 Service SW diskette 3.5” for WinTesla	0774080 0774046
*)	The nominal operating voltage for JBU–5 is 3.6 V. The supply voltage for JBU–5 must never exceed 5.0 V	

Tuning Steps

1. RX Calibration (AGC + AFC)

Reference values for the received signal strength meter are program tuned.

RSSI reference signal level programming:

– Select *Tuning –> RX Calibration*

– Connect RF generator to service jig antenna connector at 947.067710 MHz.

– Adjust signal generator level to –55 dBm + cable attenuation.

– Press *OK* button

– Adjust signal generator level to –80 dBm + cable attenuation.

– Press *OK* button.

Service software reports:

A Table of AFC Parameters:

AFC INIT Value
AFC Slope
PSW Slope

A Table for AGC Calibration:

AGC in 3 db steps 0...57 dB
DAC and voltage reading for each gain value

– Press *SAVE* button

2. I/Q Modulator Amplitude Balance and Phase Shift Tuning

The purpose of this tuning operation is to adjust the I/Q modulator d.c. offsets and the I/Q modulator amplitude balance and phase shift.

I/Q modulator d.c. offsets, amplitude balance and phase shift tuning:

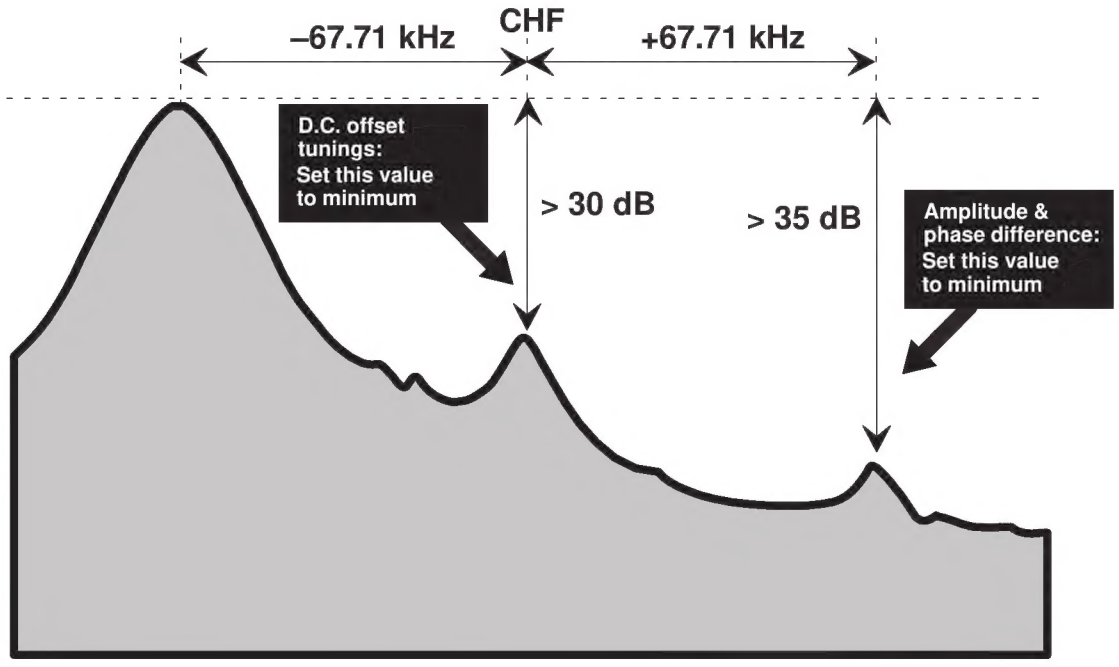
– Select *Tuning –> TX I/Q...*

– Select I/Q tuning values from PC's memory, phone's EEPROM or factory default values.

– Connect spectrum analyzer (with attenuator if needed) to service jig antenna connector.

– Check that TX power level is level 10, channel is 60 and TX data type is 1.

– Adjust spectrum analyzer centre frequency to 902 MHz, Span 200 kHz, Res BW 10 kHz, Video BW 1 kHz and Sweep time 0.5 s.


–67.71 kHz
CHF
+67.71 kHz
D.C. offset tunings: Set this value to minimum
> 30 dB
> 35 dB
Amplitude & phase difference: Set this value to minimum

– Select the "TX I d.c. offset" option.

– Adjust the level of centre frequency (CHF signal) to minimum by varying D/A converter value with <– and –> buttons.

– The amplitude difference between CHF–67.7 kHz and CHF should be >30 dB.

– Select option "TX Q d.c. offset".

– Adjust the level of signal CHF to minimum by varying D/A converter value with <– and –> keys.

– Use the ”Amplitude Difference” option.
– Adjust the level of signal CHF+67.7 kHz (902.06777 MHz) to minimum by varying D/A converter value with <– and –> keys.
– The amplitude difference between CHF+67.7 kHz and CHF–67 kHz should be >35 dB.
– Select the ”Phase Difference” option.
– Adjust the level of signal CHF+67.7 kHz to minimum by varying D/A converter value with <– and –> keys.
– When values are correct press *SAVE* button.

3. Tuning of Transmitter Power Levels

This adjustment loads the power levels of the phone transmitter into the EEPROM. When doing this, a pulse power meter or spectrum analyzer must be used.

Power levels programming:

– Select *Tuning –> TX Power...*
– Select I/Q tuning values from PC's memory, phone's EEPROM or factory default values.
– Set power supply voltage 5.0 V to module jig (MJS–6).
– Connect pulse power meter or spectrum analyzer to antenna connector.
– Check that channel is 60.
– Adjust the power level (levels 5, 15 and 19) by clicking the + and – buttons, and change levels with ↑ and ↓ keys.

Power level	**Tuning P_{OUT}/dBm (CH 60)**
5	32.5
15	13.0
19	7.0
Base	–25.0

Note: If the base calculation feature is enabled, then the base level is calculated automatically.

– Press *Calculate* button to calculate all other levels.
– Once all TX levels are correct, press *SAVE* button.

4. Energy Management Calibration

– Select Tuning –> Energy Management Calibration

– Connect the phone to the service junction box and dc cable SCB–3 between the phone and the service junction box.

– Set the switch of the service junction box to the position FLA–5.

– Connect 10.5V to the service junction box (cable PCS–1) from the power supply or from the Flash adapter (FLA–5)

– Run calibrations separately or all at once.

– Select calibrations:

Battery & charger default values

———————————————

– Select 1.Run Battery & charger default values checkbox

Battery voltage

————————

– Select 2.Battery voltage checkbox

Charger voltage

————————

– Select 3.Charger voltage checkbox

Battery size

———————

– Select 4.Battery size checkbox

Battery temperature

———————————

– Select 5.Battery temperature checkbox

Charge current

————————

– Select 6.Charge current

– Select Save without confirmation, if you don't want confirm all the selected calibration values before saving

– Run calibrations by pressing Run button

– Set supply voltage back to 8.4 V